

20. DEVELOPMENT OF A BIOMECHANICAL ARM PROSTHESIS: INNOVATIONS IN PROSTHETICS AND THEIR CONTRIBUTION TO SOCIAL INCLUSION

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The paper deals with the “Development of a Biomechanical Arm Prosthesis” project, that aims to enhance the quality of life for people with disabilities in Belarus by creating an affordable, highly functional prosthesis that mimics natural hand movements.

In modern society, the attention to inclusivity and empathy towards individuals with disabilities is becoming a key direction of development. The project of developing the biomechanical arm prosthesis is intended to be one of the solutions in this direction, offering an innovative approach to restoring lost limb functions and improving the quality of life for users [1].

Prostheses can be passive or active, the latter having the ability to control servomotors that mimic the natural movements of the human hand. The development focuses on active prostheses, incorporating innovative solutions for prosthesis control, such as the use of muscle contraction sensors and an adaptive control algorithm, which allows the user to perform precise and complex movements similar to natural ones

An important aspect of the project is its focus on accessibility. Modern prosthetics often face the problem of the high cost of foreign products, making them inaccessible to a wide range of users. The prosthesis development is aimed at creating a cost-effective solution that will be available to a larger number of people in need of prosthetics.

The project includes the development of a prototype prosthesis with five leveraged fingers, each powered by a servomotor. This provides a high degree of imitation of natural hand movements and allows the user to perform a variety of tasks from simple daily activities to more complex manipulations. The developed 3D model of the prosthesis is illustrated in Figure 1 below.

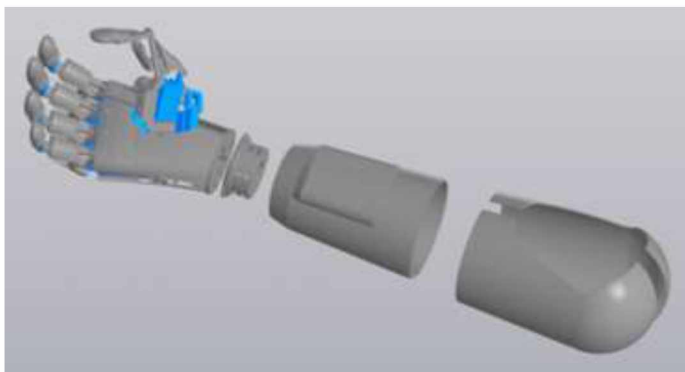


Figure 7 – Developed 3D model of the prosthesis

Prosthesis control is implemented through two main modes: a simple button press to switch between two main finger positions and more advanced remote control through a mobile application. This gives users flexibility in controlling the prosthesis and allows for adaptation to individual needs and preferences.

One of the key tasks of the project is the development of an efficient system for capturing and processing muscle signals, which will allow for precise and reliable prosthesis control. Modern sensors are sensitive to electromagnetic interference, which requires special attention to signal filtering and processing to ensure stable and accurate prosthesis operation [2].

In conclusion, the “Development of a Biomechanical Arm Prosthesis” project represents a comprehensive solution aimed at improving the quality of life for people with disabilities. It combines advanced technologies and innovative approaches to prosthetics, emphasizing accessibility, ease of use, and high functionality. This project is a vivid example of how technological progress can contribute to social inclusion and improve the quality of life.

References:

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